Original Article

Reliability and Validity of Persian Version of Perceived Stress Scale (PSS-10) in Adults with Asthma

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Abstract

Background: Asthma is a major public health problem in the world, and recent findings suggest that stress influences asthma and asthma morbidity. The 10-item Perceived Stress Scale (PSS-10) is one of the most frequently used instruments to measure psychological stress. This study was conducted to evaluate the psychometric properties of the Persian versions of the PSS-10 in adults with asthma.

Methods: In this descriptive cross-sectional study as a methodological research, 106 asthmatic patients referring to several clinics in Sanandaj (western Iran) were selected through convenience sampling. The PSS-10 and the 21-item Depression anxiety and stress scale (DASS-21) were administrated to all patients. Cronbach's alpha was used to evaluate reliability of PSS-10, and confirmatory factor analysis (CFA) and convergent validity were used to evaluate its validity.

Results: The results of confirmatory factor analysis indicated that a two-factor structure of PSS-10 provided a good fit to data. The Cronbach's alpha coefficients for negative factor, positive factor and total score (PSS-10) were 0.86, 0.83, and 0.90, respectively. The PSS-10 was positively correlated with the DASS-21 and its subscales, indicating an acceptable convergent validity. Female asthmatic patients scored higher on PSS-10 in comparison with male asthmatic patients.

Conclusion: The Persian version of PSS-10 is a valid and reliable instrument to measure perceived stress in adults with asthma.

Keywords: asthma, perceived stress scale, reliability, validity

Introduction

Asthma is one of the most common chronic diseases worldwide, with an estimated 300 million affected individuals.[1] Its prevalence has been rising over the last 20 years, although no distinctive trigger has been identified.[1,2] Various triggers have been proposed to explain this rise, including air pollution, aeroallergens, infections, tobacco smoke, and psychological stress.[3] A growing body of research suggests that psychosocial stress may contribute to asthma.[4] Recent findings have shown that stress is associated with increased risk of frequency and severity of asthma attacks.[5,6] Increasing evidence suggests that the individual, the family, and environmental stressors influence asthma and asthma morbidity.[7]

Psychological stress is "a particular relationship between the person and the environment which is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being".[8] Lazarus and Folkman proposed that "for an event or a situation to be considered stressful, it must be perceived as stressful via perceptual processes".[8] The impact of any stressful event depends on the individual's perception of it and the resources available to manage it.[8] The Perceived Stress Scale (PSS) is one of the most frequently used instruments for measuring the perception of stress. It is a self-report questionnaire developed by Cohen, Kamarck and Mermelstein in 1983.[9] The PSS is a measure of "the degree to which situations in one's life are appraised as stressful".[9] Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives. The items are easy to understand, and the response alternatives are simple to grasp. Moreover, the items are quite general in nature and hence, relatively free of content specific to any sub-population group.[9,10]

There are three versions of the PSS: 4-item (PSS-4), 10-item (PSS-10), and 14-item (PSS-14). The PSS-10 is suggested since it has adequate psychometric properties.[10] It has been used widely in various cultures and populations, and has been translated into various languages including French,[11] Spanish,[12] Portuguese,[13] Greek,[14] Arabic,[15,16] Turkish,[17] Chinese,[18,19] Japanese,[20] and Thai.[21]

Various studies suggest that the psychometric properties of the PSS-10 are satisfactory;[10–21] however, the reliability and validity of the scale have not been examined in an Iranian population, especially in adults with asthma. Therefore, the purpose of the present study was to investigate the psychometric properties of the Persian version of the PSS-10 in adults with asthma.

Materials and Methods

Patients

In this descriptive cross-sectional study as a methodological research, a total of 106 patients with asthma referring to several

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clinics in Sanandaj (western Iran) were selected through convenience sampling from December 2012 to February 2013. The inclusion criteria for this study were as follows: 1) diagnosis of asthma based on the Global Initiative for Asthma (GINA) criteria;[22] 2) age between 18 and 65 years; and 3) patients with at least elementary education. The study protocol was approved by the Ethics Committee of AJA University of Medical Sciences. Verbal informed consent was obtained from all patients.

Instruments
Perceived Stress Scale-10 Item (PSS-10)

The PSS-10 is a self-report instrument that assesses global stress or the degree to which life situations are appraised as unpredictable, uncontrollable and overloading. Respondents report the prevalence of an item within the last month on a 5-point scale, ranging from 0 (never) to 4 (very often). Scoring is completed by reverse scoring four positively-worded items (4, 5, 7 and 8) and summing all item scores. Scale scores range from 0- 40, with higher scores indicating higher levels of stress.[9,10]

Depression Anxiety and Stress Scale-21 Item (DASS-21)

The DASS-21 is a short form of DASS which is a self-report inventory composed of three subscales: Depression (DASS-D), Anxiety (DASS-A), and Stress (DASS-S).[23] This scale consists of three 7-item subscales with each item scored on a 4-point Likert scale, ranging from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time).[23] The Persian version of the DASS-21 has shown adequate psychometric properties in Iranian populations.[24] The alpha coefficients for DASS-D, DASS-A, DASS-S and total score (DASS-21) in the present study were 0.81, 0.80, 0.86 and 0.93, respectively.

Translation

The standard "forward-backward" translation procedure was used to translate the PSS-10 from English into Persian. The original English version was translated into Persian by two independent translators who were native Persian speakers with proficiency in English. The two forward translations were compared and synthesized into one common version by the research team. This version was then back-translated by a bilingual expert who had no knowledge of the wording of the original English version of the PSS-10. The two English versions were then compared and minor discrepancies were corrected. Ten asthmatic patients were asked to complete the provisional version of PSS-10 as a pilot study. Further corrections were subsequently completed, and the final version was made available for this study.

Statistical Analysis

The factor structure of the PSS-10 was examined by CFA. Two models were tested in this study: 1-One-factor model (all items); and 2- Two-factor model including "negative factor" (1, 2, 3, 6, 9 and 10) and "positive factor" (4, 5, 7 and 8). These models were tested using covariance matrices and the maximum likelihood estimation method. The goodness of fit of models was assessed using chi-square (χ^2), relative chi-square (χ^2/df), the goodness of fit index (GFI), the comparative fit index (CFI), the normed fit index (NFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). The χ^2 statistic is the traditional measure for evaluating overall model fit, but it is sensitive to sample size.[25] An alternative evaluation of

the χ^2 statistic is to examine the relative chi-square (χ^2/df) for the model. A χ^2/df ratio of less than 2 is considered indicative of a good fit.[26] For other goodness of fit indices, Good-fitting models are generally considered to fall within the range of GFI, CFI, and NFI > 0.95, RMSEA < 0.06, SRMR < 0.08 (GFI, CFI, and NFI > 0.90, RMSEA < 0.08 and SRMR < 0.1 for acceptable fitting models).[27]

The internal consistency of the PSS-10 was assessed by calculating Cronbach's alpha coefficient. Values of 0.70 or greater were considered satisfactory.[28] The convergent validity of the PSS-10 was assessed by calculating Pearson correlation coefficients between the PSS-10 and DASS-21.

The CFAs were performed using Lisrel 8.80 (Scientific Software International, Inc., Lincolnwood, IL, USA) and the other statistical analyses were performed using SPSS version 16.0 (SPSS Inc., Chicago, IL, USA). All statistical tests were two-tailed and a p-value of less than 0.05 was considered statistically significant.

Results

Demographic Characteristics of Patients

The male-to-female ratio of 106 patients was 0.71:1 and the mean age was 33.8 ± 10.9 years (range: 18 – 65 years). Among them, 61 (57.5%) patients were married, 54 (50.9%) patients were employed, and 62 (58.5%) patients had university education (Table 1).

Classifying Asthma severity

The Asthma Severity of patients was assessed according to the *National Heart, Lung and Blood Institute*.[29] The frequency of severity is presented in Table 2.

Confirmatory Factor Analysis

The goodness of fit indices for one- and two-factor models are presented in Table 3. As shown in Table 2, the one-factor model did not fit the data well (e.g. $\chi^2/df = 2.23$, GFI = 0.870 and RMSEA = 0.108). The goodness of fit indices revealed that the two-factor model was a good fit to the data ($\chi^2/df = 1.60$, GFI = 0.906, CFI = 0.980, NFI = 0.952, RMSEA = 0.076 and SRMR = 0.051). Standardized factor loadings for two-factor model are presented in Table 4. All factor loadings were statistically significant (p < 0.05), ranging from 0.63 to 0.84.

Reliability Analysis

Cronbach's alpha coefficients for assessing internal consistency of the PSS-10 were as follows: negative factor (6 items, 0.86), positive factor (4 items, 0.83), and total score (10 items, 0.90).

Convergent validity

To examine the convergent validity of the PSS-10, Pearson correlation coefficients were calculated between PSS-10 and the DASS-21. The results are presented in Table 5. As expected, the PSS-10 was significantly positively correlated with the DASS-D (r = 0.618), DASS-A (r = 0.640), DASS-S (r = 0.707) and total score (r = 0.699), indicating an acceptable convergent validity.

In order to ensure the convergent validity, linear regression was used to predict asthma severity based on the level of perceived stress. The results are presented in Table 6. As shown, the perceived stress can predict the severity of asthma well (*b* = 0.890, P < 0.0001). So, achieving a good convergent validity was con-

Table 1. Demographic characteristics of patients

	N (%)
Age (years) (Mean ± SD)	33.8 ± 10.9
Gender	
Female	62 (58.5)
Male	44 (41.5)
Marital status	
Single	45 (42.5)
Married	61 (57.5)
Education	
Elementary	11 (10.4)
Secondary	27 (25.5)
University	68 (64.1)
Occupation	
Employed	54 (50.9)
Unemployed	19 (17.9)
Housewife	16 (15.1)
Retired	2 (1.9)
Student	15 (14.2)

Table 2. Classification of asthma severity

	N	%
Intermittent	18	17
Persistent		
Mild	26	24.5
Moderate	42	39.6
Severe	20	18.9
Total	**106**	**100**

Table 3. Goodness of fit indices for tested models

Model	χ^2	df	p	χ^2/df	GFI	CFI	NFI	RMSEA	SRMR
One-factor model	78.22	35	< 0.001	2.23	0.870	0.962	0.934	0.108	0.059
Two-factor model	54.64	34	0.014	1.60	0.906	0.980	0.952	0.076	0.051

df: Degree of Freedom, χ^2/df: Relative Chi-square, GFI: Goodness of Fit Index, CFI: Comparative Fit Index, NFI: Normed Fit Index, RMSEA: Root Mean Square Error of Approximation, SRMR: Standardized Root Mean Square Residual.

Table 4. The result of confirmatory factor analysis of the two-factor model of PSS-10

	Item	Negative Factor	Positive Factor
	In the last month, how often have you …		
1	been upset because of something that happened unexpectedly?	0.84	- - -
2	felt that you were unable to control the important things in your life?	0.79	- - -
3	felt nervous and "stressed"?	0.79	- - -
6	found that you could not cope with all the things that you had to do?	0.71	- - -
9	been angered because of things that happened that were outside of your control?	0.83	- - -
10	felt difficulties were piling up so high that you could not overcome them?	0.76	- - -
4	felt confident about your ability to handle your personal problems?	- - -	0.71
5	felt that things were going your way?	- - -	0.63
7	been able to control irritations in your life?	- - -	0.74
8	felt that you were on top of things?	- - -	0.82
	Factor Correlation	**-0.84**	
	Cronbach's alpha coefficient	**0.86**	**0.83**
		0.90	

Table 5. Correlation coefficients between PSS-10 and DASS-21

	Negative Factor	Positive Factor	PSS-10
DASS- Depression	0.644	0.470	0.618
DASS- Anxiety	0.631	0.543	0.640
DASS- Stress	0.743	0.527	0.707
DASS- 21	0.718	0.548	0.699

Table 6. Regression coefficients for predicting asthma severity

Model Adjusted R Square	Adjusted R Square	Unstandardized Coefficients		Standardized Coefficients	t	P.Value
		B	Std.Error	Beta		
Perceived Stress Severity	0.791	0.114	0.006	0.890	19.94	0.000
*Dependent Variable: Severity of Asthma						

firmed.

Comparison of Perceived Stress by Sex

The independent samples t-test was used to examine gender differences in perceived stress. The results indicated that females (31.73 ± 7.32) scored significantly higher than males (26.43 ± 7.18) on PSS-10 (t(104) = 3.70, p < 0.001).

Discussion

The present study examined psychometric properties of the Persian version of PSS-10 in adults with asthma. In the present study, the two-factor model provided a better fit to the data than the one-factor model, which is consistent with previous studies.[10–21] The PSS-10 was found to have high internal consistency (Cronbach's alpha = 0.90), indicating that it is a reliable instrument for measuring the perception of stress. This finding is consistent with previous studies that have reported high internal consistency for PSS-10.[10–21] The convergent validity of the PSS-10 was supported by a strong correlation between the total PSS-10 scores and total score on the DASS-21, and its subscales. This finding is consistent with Andreou et al.[14]

To further examine the convergent validity, the classification of asthma severity was determined. The predictive power of the PSS-10 in determining asthma severity was estimated by linear regression. Thus, it can be deduced that use of valid PSS-10 can be also helpful in predicting the severity of asthma. This finding is congruent with Schmaling et al.[6] and Sandberg et al.[30]

In the present study, females scored significantly higher than males on the PSS-10, suggesting that females tend to perceive stressful life events as more stressful than males. This finding is consistent with Matud[31] and Kimura et al.[32]

The present study has several limitations. First, the patients were not selected by random sampling method, and thus may not be representative of Iranian adults with asthma. Second, generalization of the results may be affected by the sample (restriction to adults with asthma). Third, the test-retest reliability was not assessed in this study.

In summary, the Persian version of PSS-10 is a valid and reliable instrument for measuring the perception of stress in adults with asthma. However, further psychometric studies in diverse populations are needed.

Acknowledgments

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